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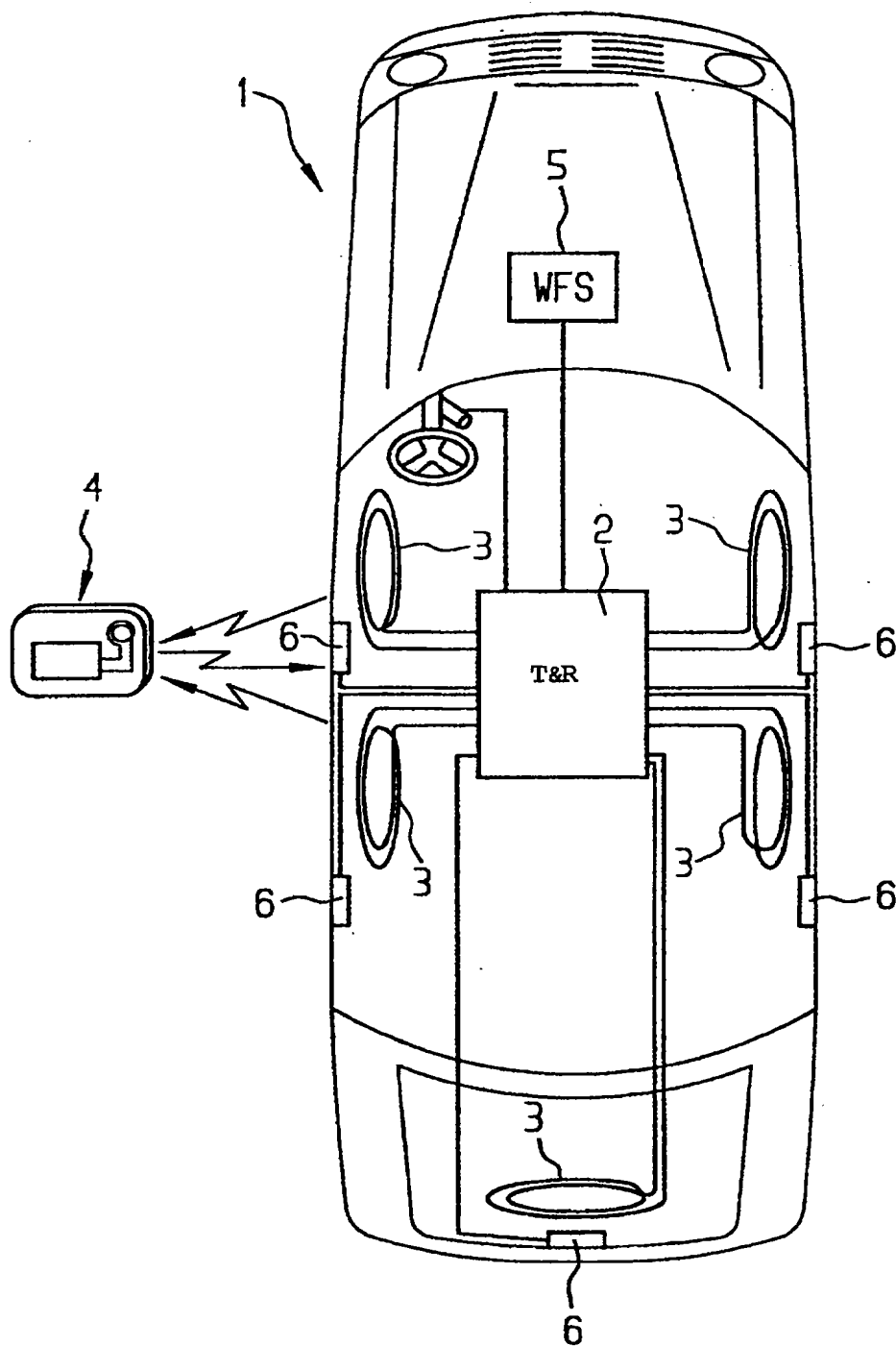
(54) Abstract Title

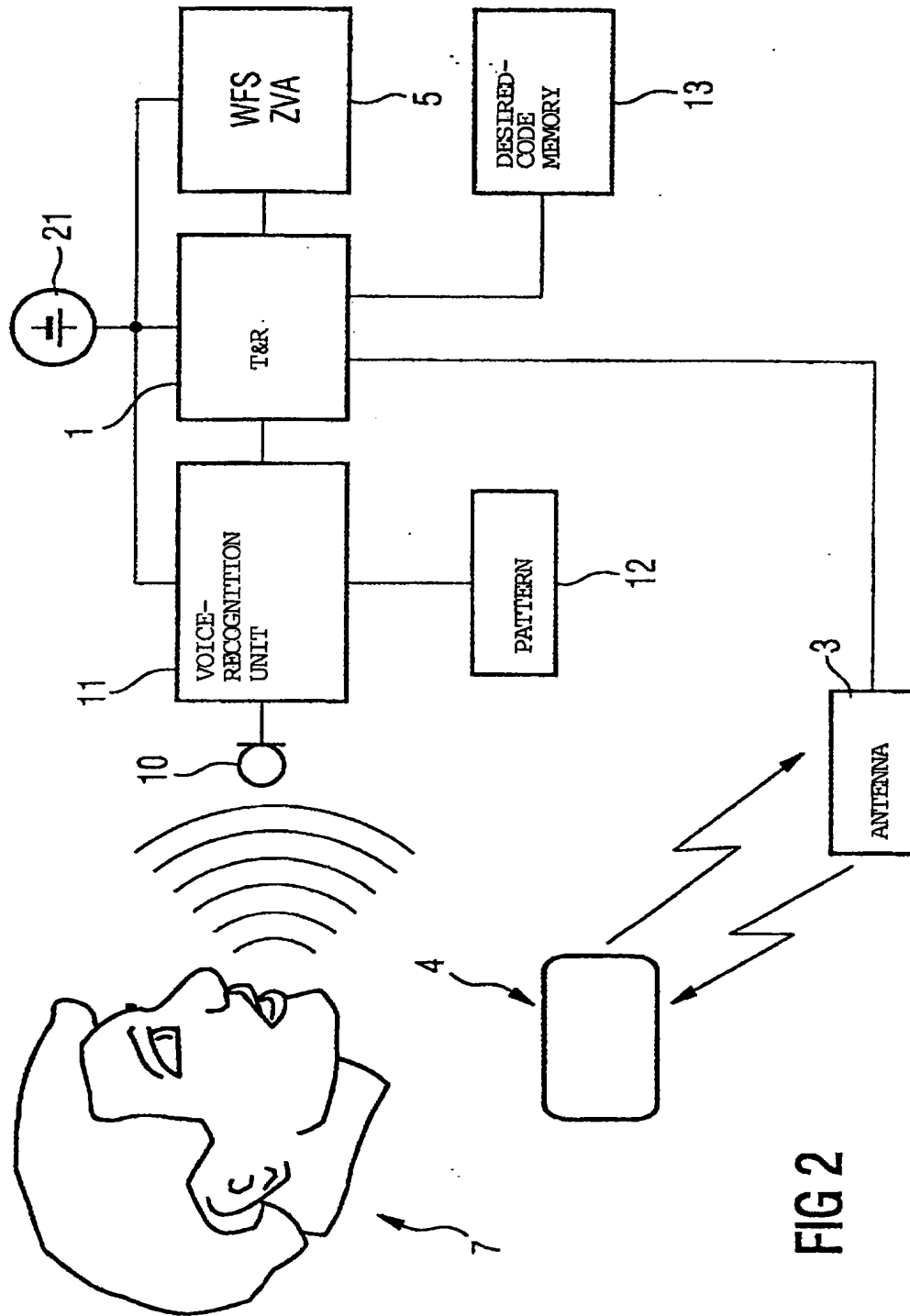
Access control device

(57) A biometric switch releases an inquiry-response dialogue between a motor vehicle, or other object to be protected, and a portable code transmitter, only if biometric data is verified. Not until the inquiry-response dialogue has also taken place successfully is access to the motor vehicle or other object allowed.

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FIG 1





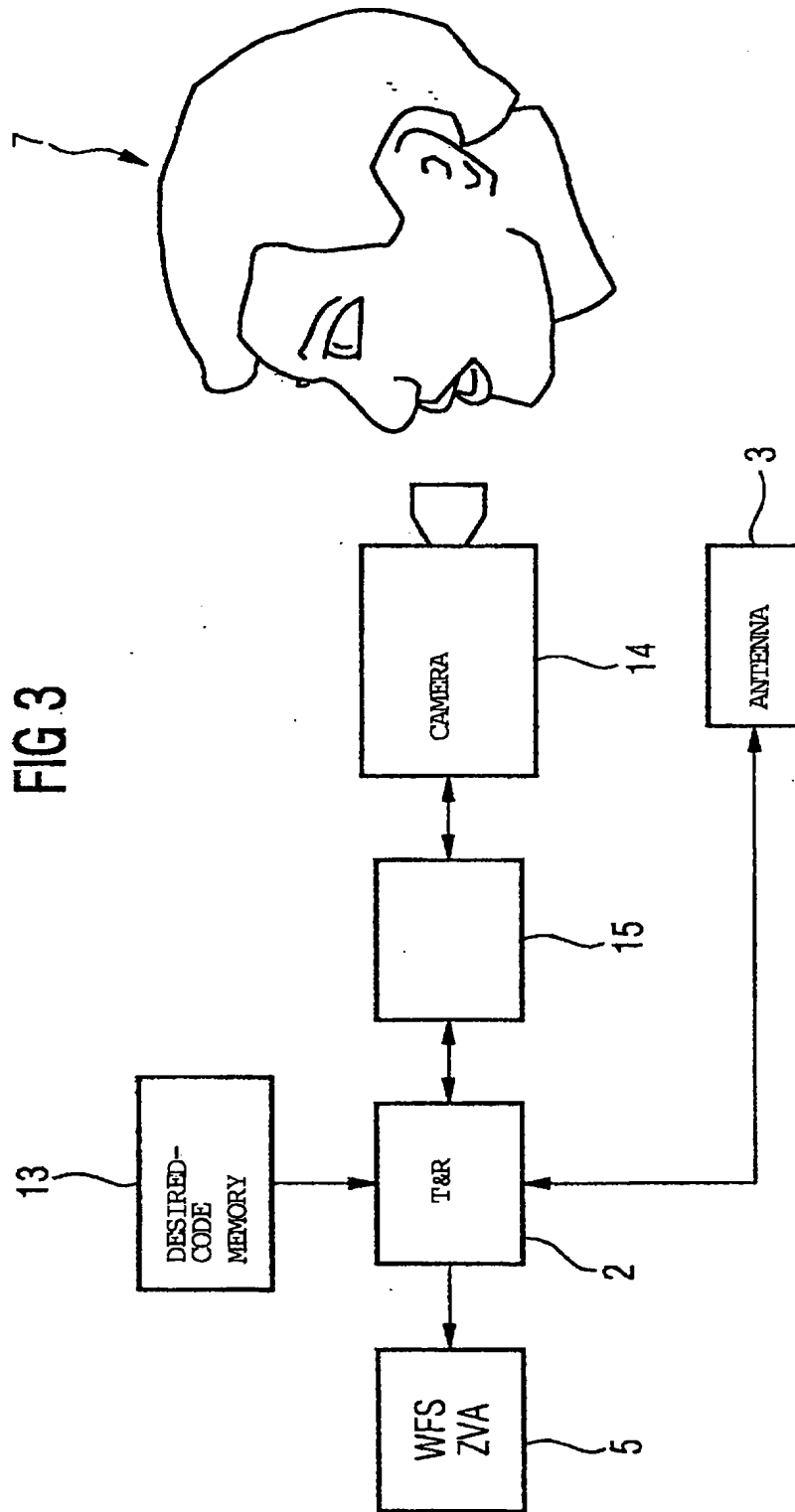
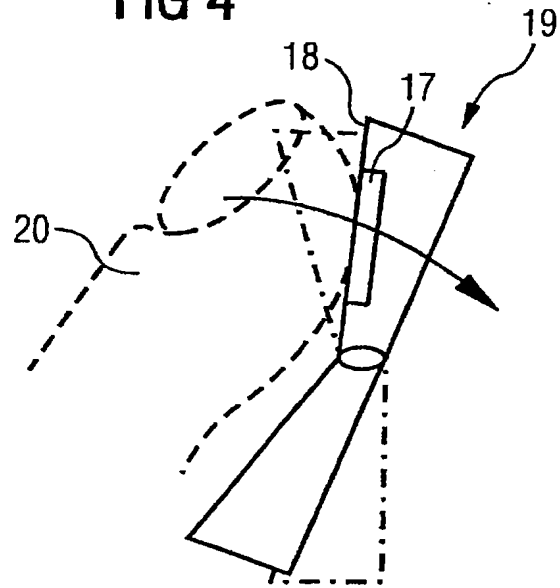


FIG 4



ACCESS CONTROL DEVICE

The invention relates to an access control device for controlling access to, or use of, an object, the access control device being of the type having a transmitting and receiving unit arranged in or on the object for emitting an inquiry code signal and/or receiving a response code signal; a portable code transmitter which emits the response code signal; an evaluating unit arranged in the object, which checks the received response code signal for its authorisation and, if authorisation is recognised, releases a security device; and a release unit, which emits a release signal, which causes the inquiry code signal or the response code signal to be emitted. The invention particularly relates to an access control device for a motor vehicle.

Such an access-control device is known, for example, from the European Patent specification 0 138 090 B1. This has a transmitting and receiving unit arranged in a motor vehicle. As a result of the actuation of a release switch, which is located on the door handle, an inquiry signal is emitted by the transmitting and receiving unit. If a portable code transmitter receives the inquiry signal, it automatically sends back a response signal. This response signal is evaluated, and once authorisation has been checked, one or all of the doors are unlocked or an immobiliser is released.

In the case of such an access-control device, anyone can release the so-called inquiry-response dialogue by actuating the switch on the door handle. As soon as someone gains possession of the code transmitter without authorisation, the vehicle is fully available to them.

In the case of a further access-control device known from DE 40 27 491 C2, the inquiry-response

dialogue is released by a voice command. Depending on the content of the voice command, a corresponding action is then carried out at the motor vehicle if the inquiry-response dialogue has been successful.

5 Also in the case of this access-control device, anyone can input the appropriate voice commands. If this person is also in possession of the code transmitter, even without authorisation, the vehicle is unlocked and can be used.

10 The invention thus seeks to develop an access-control device which has increased security against unauthorised use.

 According to the invention there is provided a device for controlling access to, or use of, an object,
15 having a transmitting and receiving unit arranged in or on the object for emitting an inquiry code signal and/or receiving a response code signal; a portable code transmitter which emits the response code signal; an evaluating unit arranged in the object, which checks
20 the received response code signal for its authorisation and, if authorisation is recognised, releases a security device; and a release unit, which emits a release signal, which causes the inquiry code signal or the response code signal to be emitted, wherein the
25 release unit has a fingerprint recognition unit, which detects the fingerprint features of a user, which fingerprint features are checked in the release unit for their authorisation, and does not generate the release signal until authorisation has been verified.

30 Thus in accordance with the invention there is provided a release unit for the inquiry-response dialogue that detects fingerprints of the user. Only if the fingerprints are recognised as authorised is the inquiry-response dialogue initiated.

35 This arrangement has the advantage that only the authorised user can release the inquiry-response

dialogue. This offers protection against car-napping. It also offers protection against illegal recording of the inquiry-response dialogue and reproduction of the illegal recording in order to gain entry to the object. Since, in accordance with the invention, a double check for authorisation is carried out, the access-control device is more reliable. Insurance fraud is also prevented as a result, because the passing on of the code transmitter alone no longer leads to success in gaining entry.

Advantageous developments of the invention are set out in the subclaims. As a result of the recognition of the user, adjustments which are individual to the person and which the user would carry out anyway after entering can be made in the object. For example, the access-control device could be used in a motor vehicle. As soon as the person desiring entry is recognised - as authorised - seats, air-conditioning and mirrors can automatically be adjusted to the user.

For a better understanding of the present invention, and to show how it may be brought into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 shows a block-circuit diagram of the access-control device in accordance with the invention for controlling access to a motor vehicle;

Figure 2 shows a block-circuit diagram of a voice-recognition unit of an access-control device;

Figure 3 shows a block-circuit diagram of an image-processing unit of an access-control device; and

Figure 4 shows a fingerprint-recognition unit of the access-control device according to Figure 1.

An access-control device in accordance with the invention checks the authorisation of a person in order to allow this person access to an object or use of the object. In this connection, not only is the

authorisation checked, but the respective person is also identified. An exemplary access-control device in accordance with the invention is explained in greater detail in the following with the aid of the use in a motor vehicle 1 as shown in Figure 1.

In accordance with the arrangement shown in Figure 1, the access-control device has a transmitting and receiving unit 2, by way of the antennae 3 of which inquiry code signals can be emitted and response code signals received. If a portable code transmitter 4 receives an inquiry code signal, it automatically sends back a response code signal. If this is received by the transmitting and receiving unit 2, it is evaluated there. If the response signal proves to be authorised, a security device 5 is released.

This security device 5 can, for example, be an immobiliser, with which the starting of the internal-combustion engine and the driving of the motor vehicle 1 is possible only with authorisation. Likewise, the security device 5 can be a locking system, such as a central-locking system, by which the doors and rear lid (boot) are locked or unlocked if the response code signal is authorised.

The inquiry signal, however, is emitted only if it is first of all released. For this purpose, a respective release unit 6 is provided, for example, on all of the doors of the motor vehicle 1. In accordance with the invention, this release unit 6 has a biometric detection unit, which detects biometric features of a user 7. The biometric features are evaluated in the release unit 6. The release unit 6 outputs a release signal only if a user 7 is clearly verified and his biometric features are recognised as authorised.

The fingerprint of the user 7, his voice, his hand geometry, his signature, his facial features, his iris, etc. can serve as biometric features.

Figure 2 shows the access-control device having a release unit 6 which detects the spoken sounds (voice) of a user 7 as biometric features. For this purpose, there is provided a microphone 10, which is connected to a voice-recognition unit 11. If the user 7 speaks one or more sounds, a word, part of a word or a whole sentence, his voice is detected and compared with stored speech patterns (stored in a pattern memory 12).

A speaker identification and a speaker verification take place. Therefore, the speaker himself is recognised and it is recognised whether he is also authorised. When the user 7 has been clearly recognised with the aid of his voice, the transmitting and receiving unit 2 is activated by means of the release signal. The transmitting and receiving unit 2 thereupon emits the inquiry code signal by way of one or more antennae 3.

After this, the transmitting and receiving unit 2 waits for the response code signal. If the response code signal is received within a predetermined time, the response code signal is checked for its authorisation. For this purpose, the item of code information contained in the response code signal is compared with an item of desired code information stored in a desired-code memory 13. If the response code signal is authorised, access to the motor vehicle 1 is released by triggering or releasing the security device 5.

In the present exemplary embodiment for use in a motor vehicle 1, the security device 5 can be a locking system (central locking system) or an immobiliser. Thus, access to the motor vehicle as object and the use of the motor vehicle are rendered possible.

Further exemplary embodiments for the release unit 6 are shown in Figures 3 and 4. Elements having the same construction or function here have the same

reference numbers as in Figures 1 and 2.

5 The release unit 6 can also detect and evaluate
biometric features of the user 7 on an optical basis.
For this purpose, there is provided in accordance with
Figure 3 a video camera 14, which records a video image
of part of the user 7, such as the face or iris, for
example. The recorded image is then evaluated in an
image-processing unit 15. For this purpose, it is
compared with stored patterns. If the user 7 is
10 recognised as a result of the comparison, the
transmitting and receiving unit 2 is instructed to emit
the inquiry code signal by way of an antenna 3,
whereupon it awaits the reception of the response
signal.

15 The response code signal contains an item of
encoded information, which represents an authorisation
and is to be checked. If the response code signal is
received, the item of encoded information contained
therein is compared with an item of expected desired
20 code information that is stored in the desired-code
memory 13. In the case of at least substantial
agreement with the item of desired code information,
the security device 5 is released.

25 The release unit 6 can also have a fingerprint
sensor 17, which detects the fingerprint of a user 7
(Figure 4). Advantageously, this fingerprint sensor 17
is integrated in an actuating surface 18 of a switch
19. As soon as the user 7 actuates the switch 19 with
his finger 20, the fingerprint of the portion of the
30 finger 20 that rests on the actuating surface is
detected. The fingerprint is then evaluated, and a
check is carried out to see who the user 7 is and, if
appropriate, whether the user 7 is authorised. If the
user 7 is clearly recognised and is accepted as
35 authorised, the inquiry-response dialogue is then
released.

The biometric switch 19 (as part of the release unit 6; here together with the fingerprint sensor 17) can be arranged on each door handle, on the opening portion of the rear lid or at any other place on the motor vehicle 1. Likewise, such a switch 19 can be arranged inside the motor vehicle 1, in order to start the motor vehicle 1. In this case, the switch 19 is an ignition/starting switch. If the user 7 is recognised with the aid of his fingerprint, the inquiry-response dialogue is released. If the inquiry-response dialogue is successful (code information recognised as authorised), the internal-combustion engine is started and the motor vehicle can be moved. The engine is switched off again if the inquiry-response dialogue was not successful.

Advantageously, with the switching of the switch 19, the power supply for the release unit 6 for detecting the biometric features and for the rest of the units can be switched on. For this purpose, a micro-switch (not shown) can also be arranged in the actuating surface 18, which micro-switch is switched if the actuating surface 18 is approached, touched or depressed, and as a result of this a power source 21 (see Figure 2) is switched on. As a result of this, no power is used in the rest state. Only if necessary, i.e. in the case of an actual desire for entry, is the power supply switched on by actuating the switch 19.

With the access-control device in accordance with the invention, a double check for authorisation of the user 7 takes place. On the one hand, a biometric feature is checked and, on the other hand, an item of code information which originates from a portable code transmitter 4.

The user 7 (even if he is unauthorised) therefore has to fulfil both authorisation criteria in order to obtain unrestricted access to the vehicle or object.

In this way, in the case of a vehicle, the danger of car-napping is reduced, because the potential thief not only requires the portable code transmitter 4 but must also pass an authorisation test with biometric features. Consequently, insurance fraud can no longer be carried out so easily, because it is no longer sufficient for a swindler to sell the code transmitter 4 (key) together with the motor vehicle 1 and report the vehicle as stolen. The supposed buyer cannot use the motor vehicle 1 because access and use are permitted only when the user is clearly identified, and only as a result of this is the inquiry-response dialogue started.

With the aid of the access-control device, adjustments which are individual to the user can also be made in the object. The user 7 is recognised with the aid of the biometric detection unit. If user adjustments are stored in the object, they can be called up as soon as the user 7 desiring access is established. There can be provided for this purpose a central control unit (not shown) in which these adjustments are stored. Thus, in the motor vehicle 1, the seats, the air conditioning, the mirrors, driving habits, etc. can automatically be adjusted in a manner specific to the person as soon as the user 7 is verified.

These adjustments could also be carried out by the transmitting and receiving unit 2, provided that the latter has for this purpose a memory and corresponding control means.

The biometric detection unit 10, 14, 17 can also be mounted on the portable code transmitter 4. As soon as the user 7 places his finger on the fingerprint sensor 17, for example, the user 7 is identified and a check is carried out to see whether he is authorised. If he is authorised, a code signal is emitted by the

code transmitter 4 which is in turn checked on the object side for its authorisation. If this code signal is also authorised, access is permitted.

5 Computers, telephones, garages, hotel rooms, business premises, safety areas in buildings, etc. can also be objects to which entry or access is desired or of which the use is desired.

10 Voice-recognition systems, image-recognition systems and fingerprint-recognition systems as such are sufficiently known and therefore do not need to be explained in full detail. In the invention, known systems are used in order to recognise the user 7 with the aid of biometric features. Only after identity has been recognised is the inquiry-response dialogue released.

15 The transmitting and receiving unit 2 is arranged in or on the object. In this connection, the transmitting and receiving unit 2 can be constructed in a joint housing as a central control apparatus. There can also be a transmitting unit and a receiving unit 20 which are arranged in or on the object in a manner such that they are spatially separated from each other. A plurality of transmitting and receiving units 2 can also be arranged in or on the object.

25 Likewise, a plurality of antennae 3 can be arranged at exposed points on or in the object. The antennae 3 can be used both for transmitting and for receiving signals. Likewise, antennae 3 can be provided only for transmitting and other antennae 3 30 only for receiving. Advantageously, the antennae 3 are constructed as air-core coils (frame antennae). Equally, the antennae 3 can be constructed as ferrite antennae, as rod antennae or as other transmitting and/or receiving antennae.

35 In the case of use in a motor vehicle 1, the antennae 3 are preferably arranged in the doors (door

frame) between the outer door panel and the inner door lining, or in the outside mirrors.

CLAIMS

1. Device for controlling access to, or use of,
an object, having a transmitting and receiving unit
arranged in or on the object for emitting an inquiry
code signal and/or receiving a response code signal; a
portable code transmitter which emits the response code
signal; an evaluating unit arranged in the object,
which checks the received response code signal for its
authorisation and, if authorisation is recognised,
releases a security device; and a release unit, which
emits a release signal, which causes the inquiry code
signal or the response code signal to be emitted,
wherein the release unit has a fingerprint recognition
unit, which detects the fingerprint features of a user,
which fingerprint features are checked in the release
unit for their authorisation, and does not generate the
release signal until authorisation has been verified.

2. Access-control device according to claim 1,
wherein the release unit is connected to a central
control unit in which adjustments which are individual
to the person are assigned to each user, which
adjustments are made in the object after recognition of
the user.

3. Access-control device according to one of the
preceding claims, wherein the release unit is arranged
on the object side and releases an inquiry code signal
after identity has been recognised.

4. An access control device substantially as
herein described, with reference to the accompanying
drawings.

5. Access-control device according to one of the
preceding claims, wherein the object is a motor vehicle
and the security device is a central locking system or
an immobiliser.

6. Access-control device according to claim 5,
wherein the release unit is a manually operable

ignition starting switch, which has a fingerprint-recognition unit on its actuating surface.

7. A motor vehicle having an access control device as claimed in claim 5 or 6.



13

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Claims searched: 1-7

Examiner: Mike Davis
Date of search: 14 October 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4H (HTG)

Int Cl (Ed.6): G07C, G06F, E05B, B60R

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO 98/11750 A2 (LI ET AL) eg abstract, page 13 line 13 to page 14 line 23, page 20 line 32 to page 21 line 31, and page 22 lines 4-6	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.